

2006 AgStar National Conference

“European Digester Technology”

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and

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PRO-DAIRY















17 6:52AM



Nature of New England







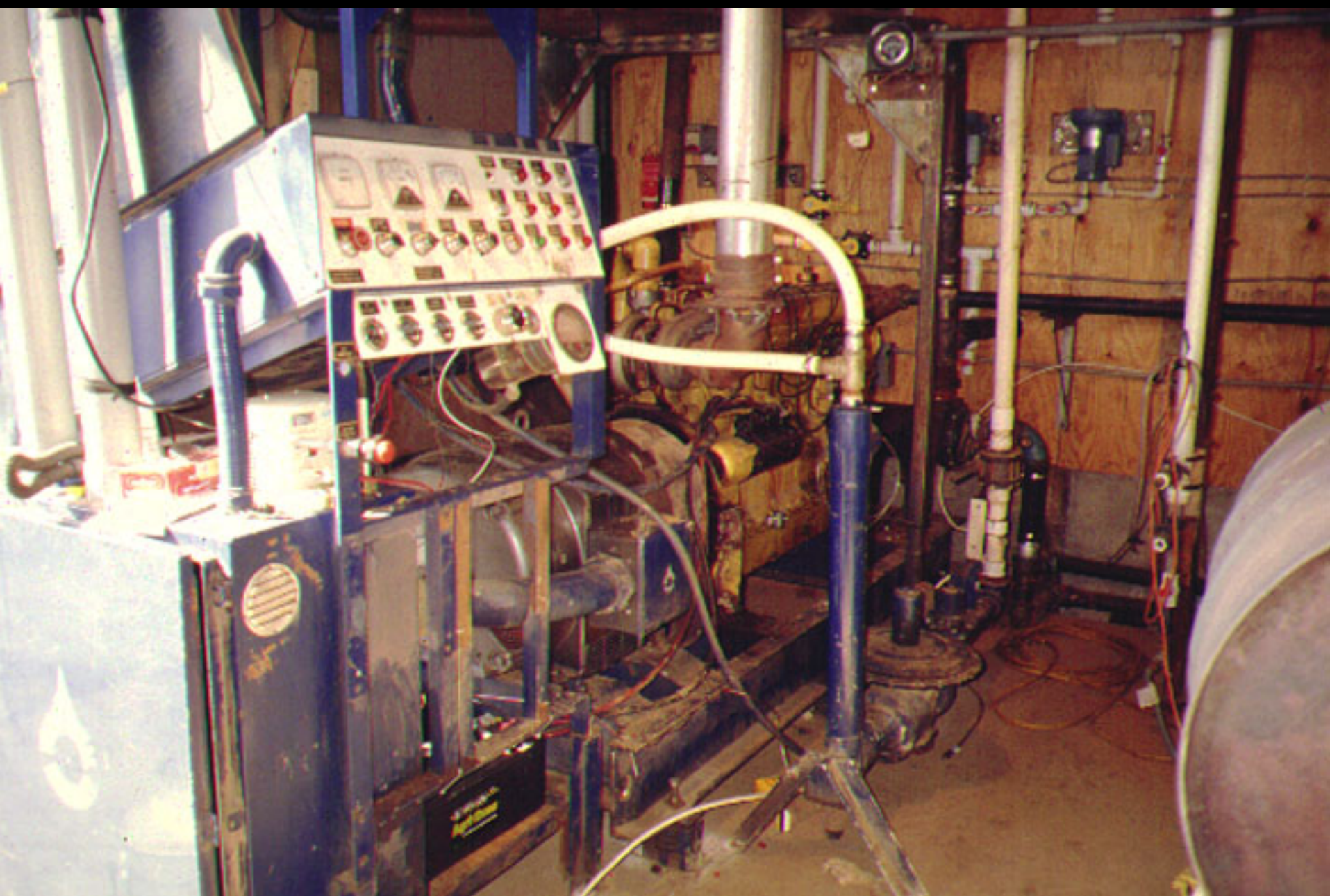


Table 4. Estimated net income or loss for the five digester systems.

Farm					
	AA	DDI	NH	ML	FA
Number of Cows		850	1,100	740	100
Capital Costs					
Digester Set		\$418,000 ^{*4}	\$339,400	\$298,149	\$80,183
Separator Set		00	\$61,000	\$61,689	\$44,013
Gas Utilization Equipment		00	\$287,300	\$130,431	\$13,135
Total Capital Cost			\$667,700	\$490,269	\$137,331
Total Capital Cost Per Cow	\$606			\$663	\$1,373
Annual Projected Capital Cost	\$25,468			\$49,016	\$13,396
Annual Projected Capital Cost Per Cow	\$51				\$134
Total Estimated Annual Cost ^{*1}	\$37,540	\$79,317			\$21,497
Total Estimated Annual Cost Per Cow ^{*1}	\$75	\$93			\$215
Total Estimated Annual Revenues	\$56,445	\$60,400 ^{*3}	\$77,680	\$2	
Total Estimated Annual Revenues Per Cow	\$113	\$71 ^{*3}	\$71		
Total Estimated Annual Cost or Benefit ^{*1 *2}	\$18,906	-\$18,917 ^{*2 *3}	-\$26,280 ^{*2}	\$2	
Total Estimated Annual Benefit Per Cow ^{*1 *2}	\$38	-\$22 ^{*2 *3}	-\$24 ^{*2}	\$293	-\$106 ^{*2}

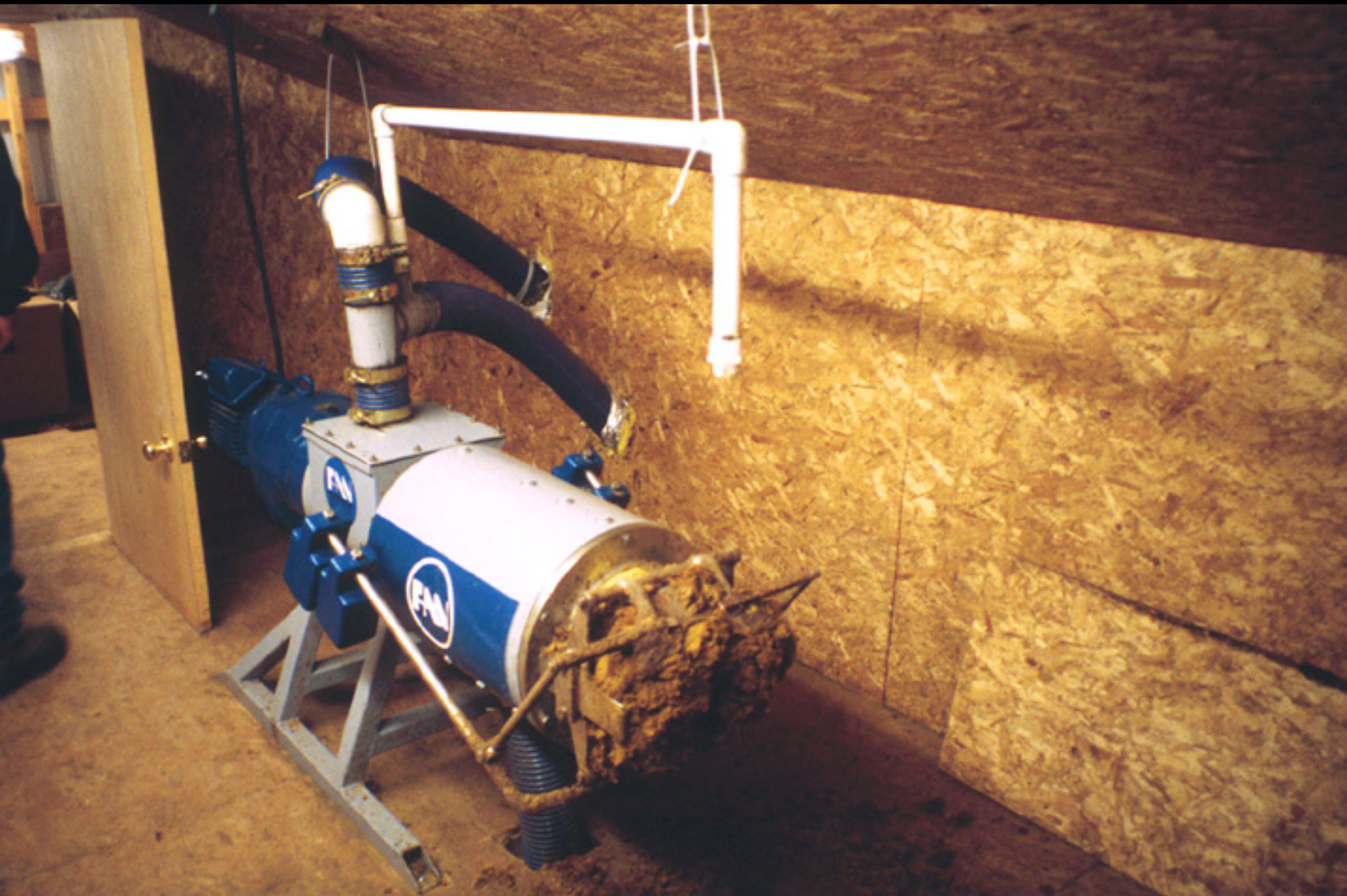
^{*1} Does not include system electrical use.

^{*2} Negative numbers mean the farm incurs a net loss from the digester system.

^{*3} The electrical savings for DDI assumes the price of electricity is 10 cents/ Kw. This farm actually incurs a lower cost due to a specific business initiative. Since this is not typical of most dairy farms, the higher price is used.

^{*4} This cost assumes the microturbines were purchased new.

Source: Wright and Gooch, 2004







Denmark Legislation

1. 9-month manure storage period required
2. 40 percent of a storage's capital cost covered by the government if the farmer supplies manure to biogas plant.
3. Restrictions on the amount of manure land applied – farms cooperating with biogas plants only get back the amount of manure they can legally apply.

Denmark Legislation (con't)

4. Organic waste cannot be land filled.
5. Organic waste incinerated is taxed, but exempt if recycled (includes AD).
6. Power companies must purchase electricity
7. Government provides 0.27 DKK per KWh

Denmark Legislation (con't)

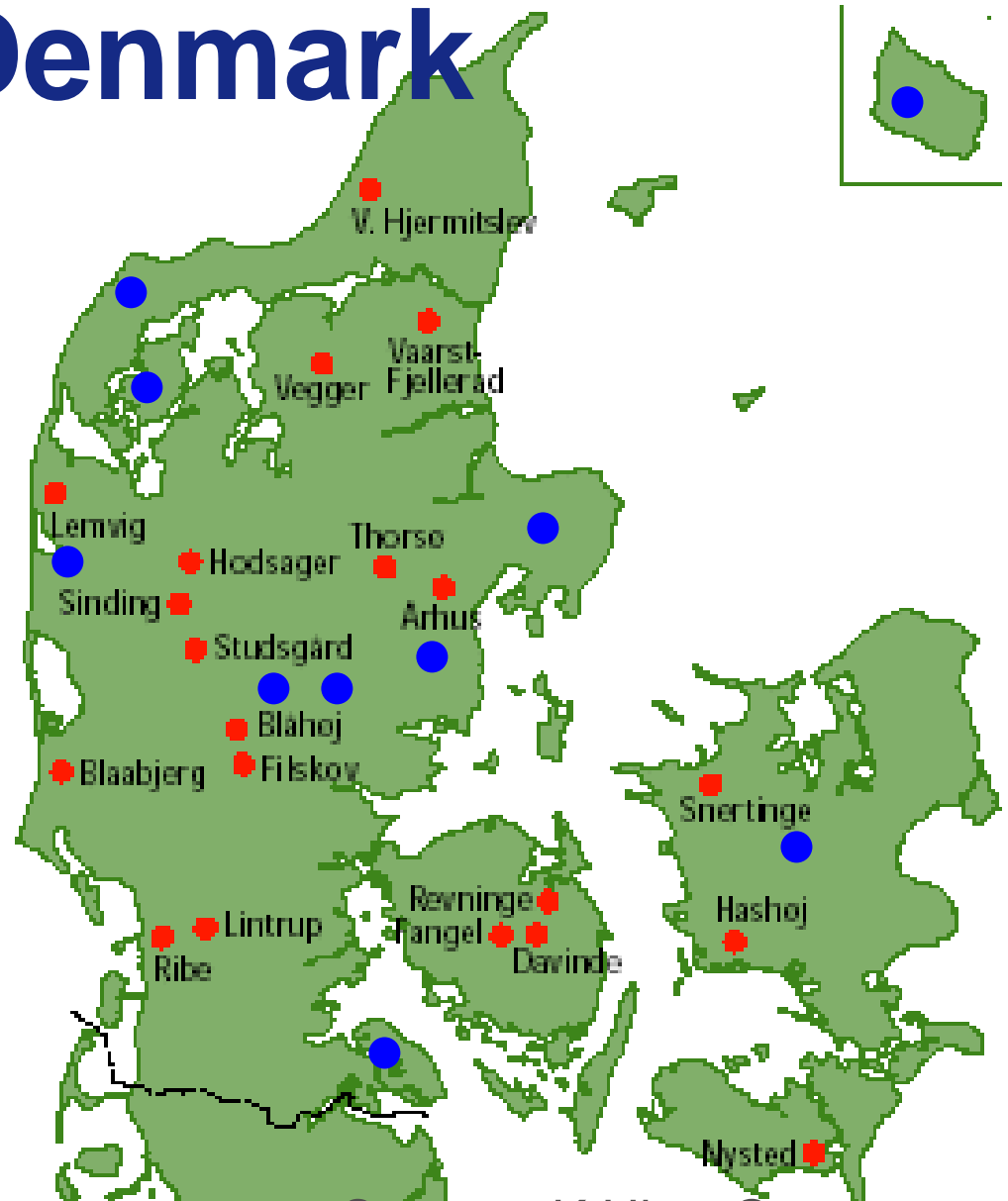
7. Government provided 20 to 40 percent investment grants for biogas plants.
8. Low interest loans for plants that collaborated with district heating.
9. Biogas and heat from biogas plants is exempt from energy taxes.



Centralized AD plants in Denmark

First: 1984
Last: 1998

● = Existing
● = Planned



Source: K.Hjort-Gregersen, 2006



EGSGAARD HOLSTEIN







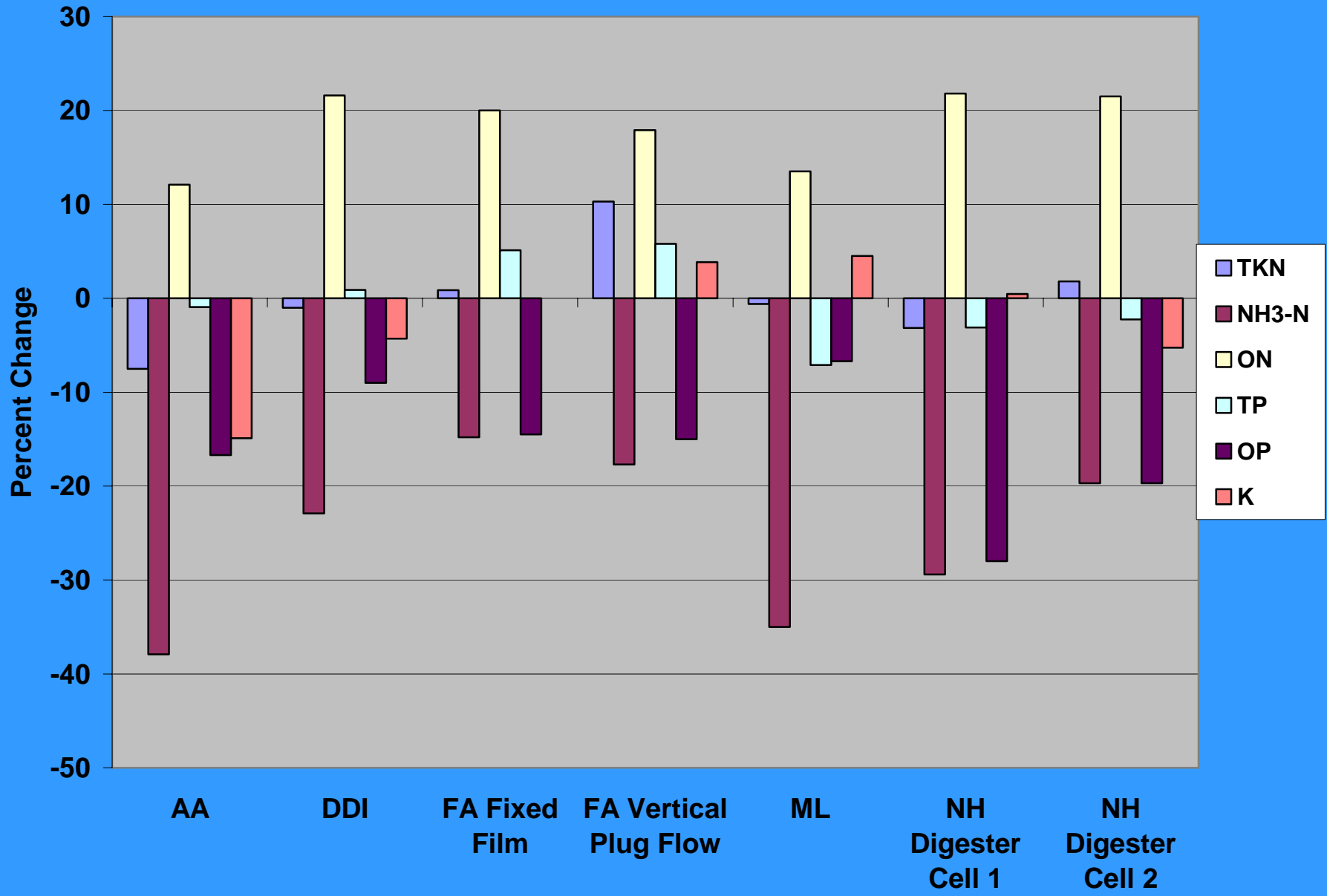








Percent Change: Nutrients









Denmark Centralized Digesters Ownership

	<u>No. of Plants</u>
Farmer Owned Co-operatives	9
Farmer and Consumer Owned	5
Municipalities	3
Private Foundations	2
Limited Company	1

Denmark Centralized Digesters¹

	<u>Least</u>	<u>Greatest</u>
Capacity (m ³)	750	9,200
Manure received (m ³)	658	16,006
Substrate received (m ³)	236	3,947
Theoretical HRT (days)	10	41
Biogas Production (m ³)	40,000	639,514
Biogas per Biomass (m ³ /m ³)	25.8	105.6
Electrical Power (kWh)	227,940	1,380,210

¹For September, 2005

Denmark Centralized Digesters Revenue

	<u>Revenue</u>
Tipping Fees:	1/3
Electricity Sales:	1/3
Heat Sales:	1/3

Denmark Centralized Digesters Economics

	<u>No. of Plants</u>
Acceptable	5
Balance	5
Under Pressure	3
Unsatisfactory	4

Potential Health Concerns

1. Bacteria

Pasteurization:
70C for one hour

3. Intestinal Parasites

4. Others

Pasteurization Equivalent

Temperature (C)	MGRT in a Thermophilic Tank (hrs.)
52	10
53.5	8
55	6

Source: Danish Ministry of Environment and Energy, 2000

Pasteurization Equivalent

Temp. (C)	MGRT by Treatment in a Separate Sanitation Tank (hrs.)	
	Before or After Thermophilic Digestion	Before or After Mesophilic Digestion
55	5.5	7.5
60	2.5	3.5

Source: Danish Ministry of Environment and Energy, 2000





















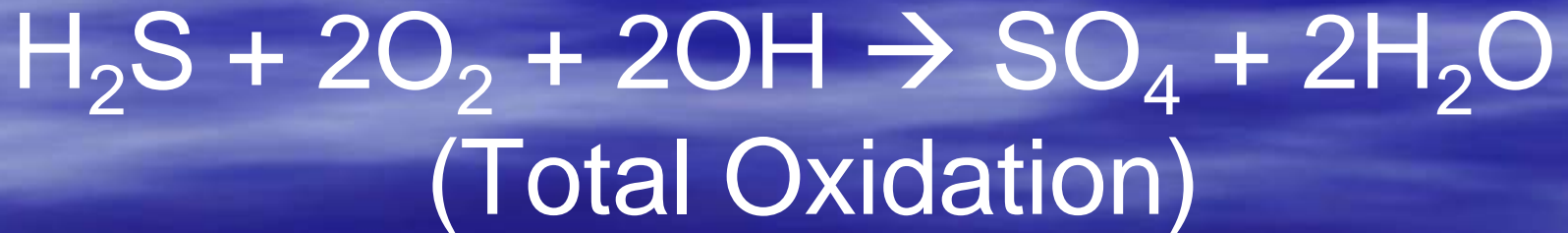
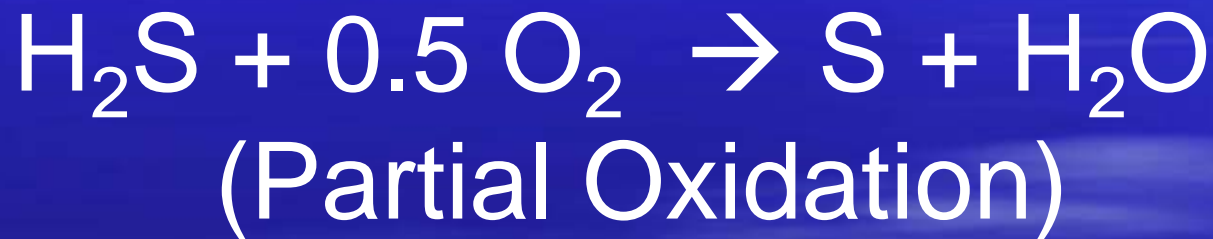






Hydrogen Sulfide (H₂S)

Biological Reduction



Thiobacillus sp.













04/09/2006





04/13/2006



04/13/2006























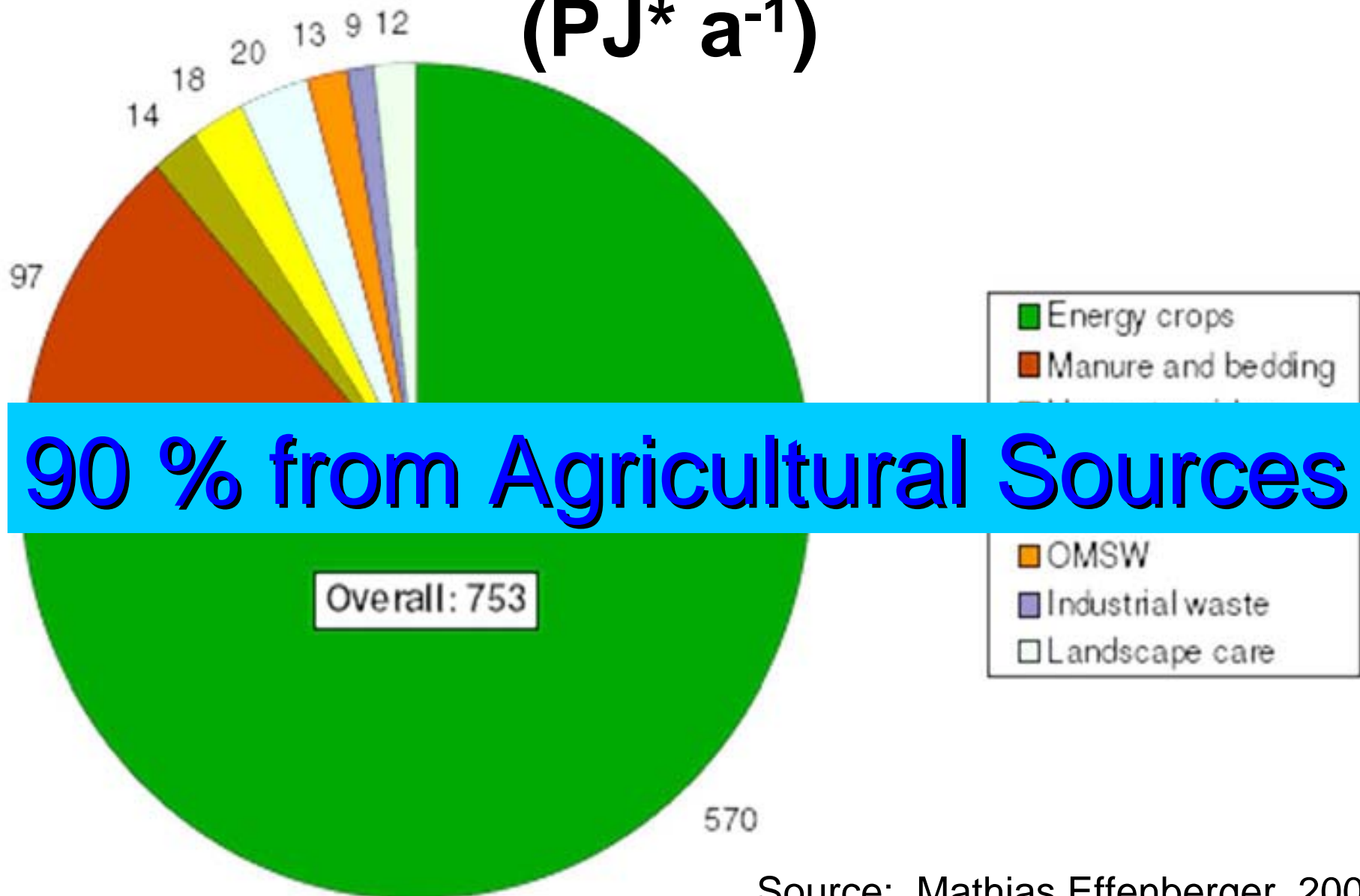


garant
Kotte

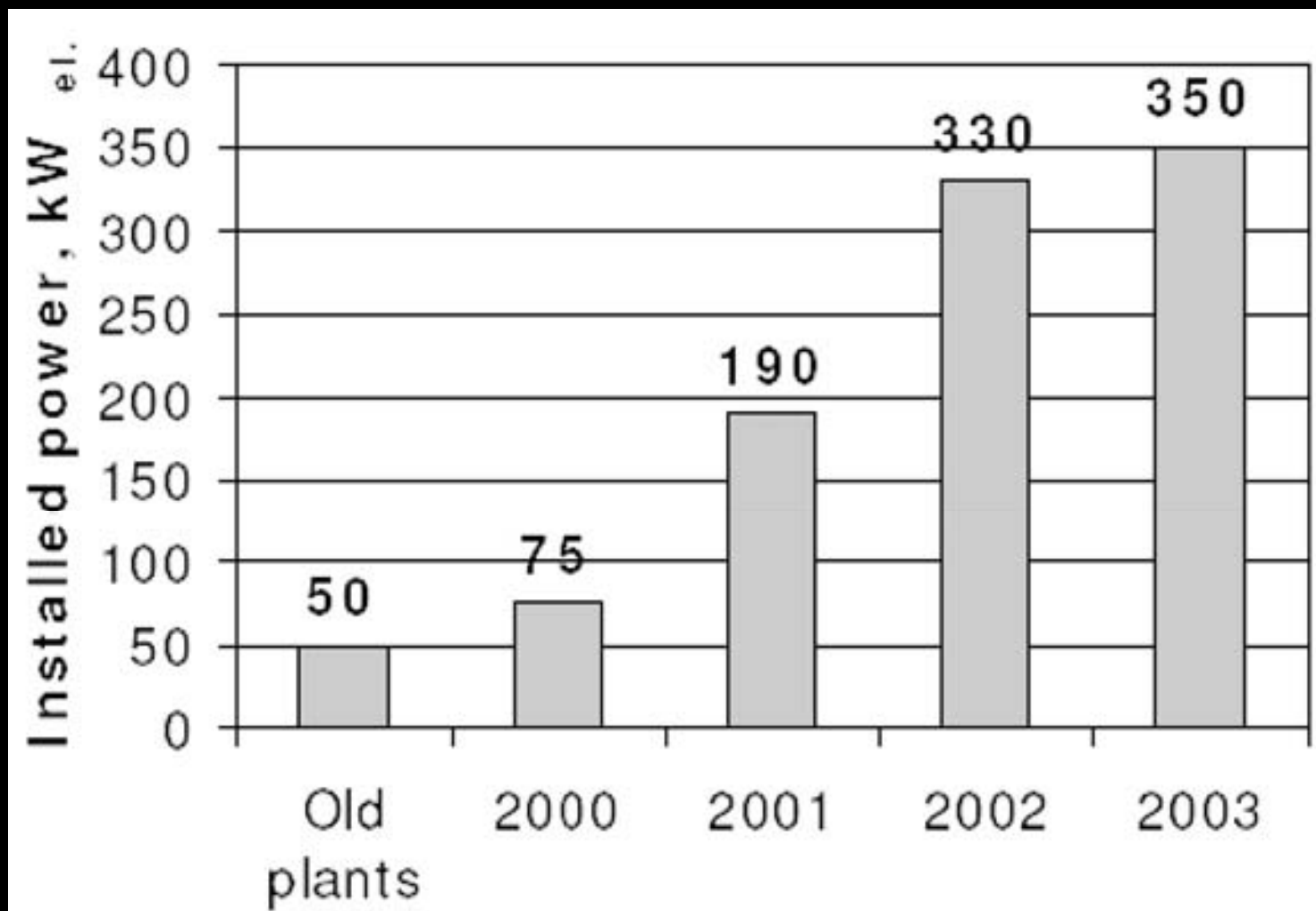
Nikolaus Lengi
Landwirtschaftlicher Unternehmer
Strunk 1
80119 Oding
Tel 0246341-2387

TS142171

Technically Usable Energy Potential (PJ* a⁻¹)



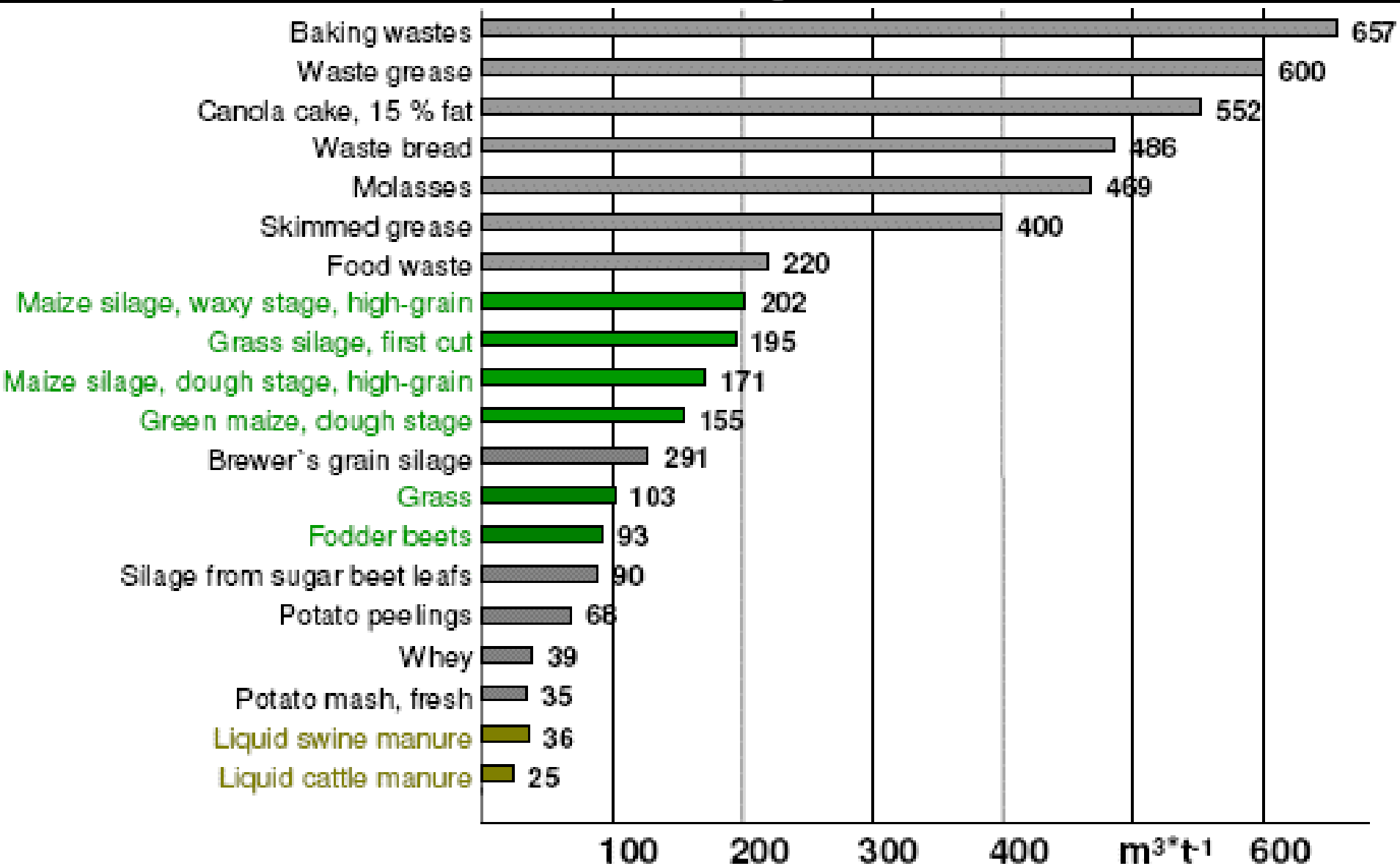
Average Size of New Biogas Plants in Germany



Source: Mathias Effenberger, 2006

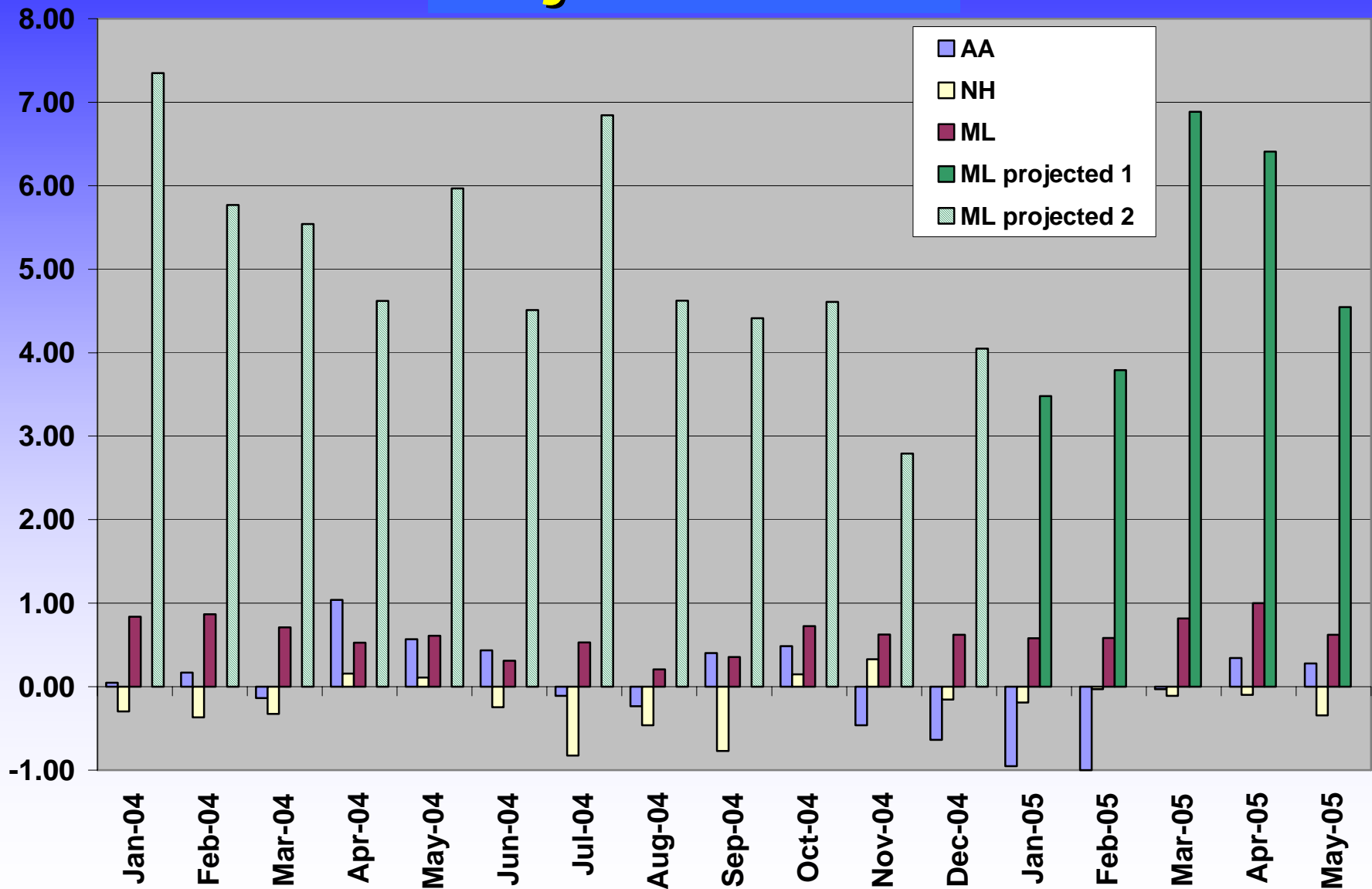


Potential Biogas Yields



Source: Mathias Effenberger, 2006

Electrical Energy Surplus Projections ML

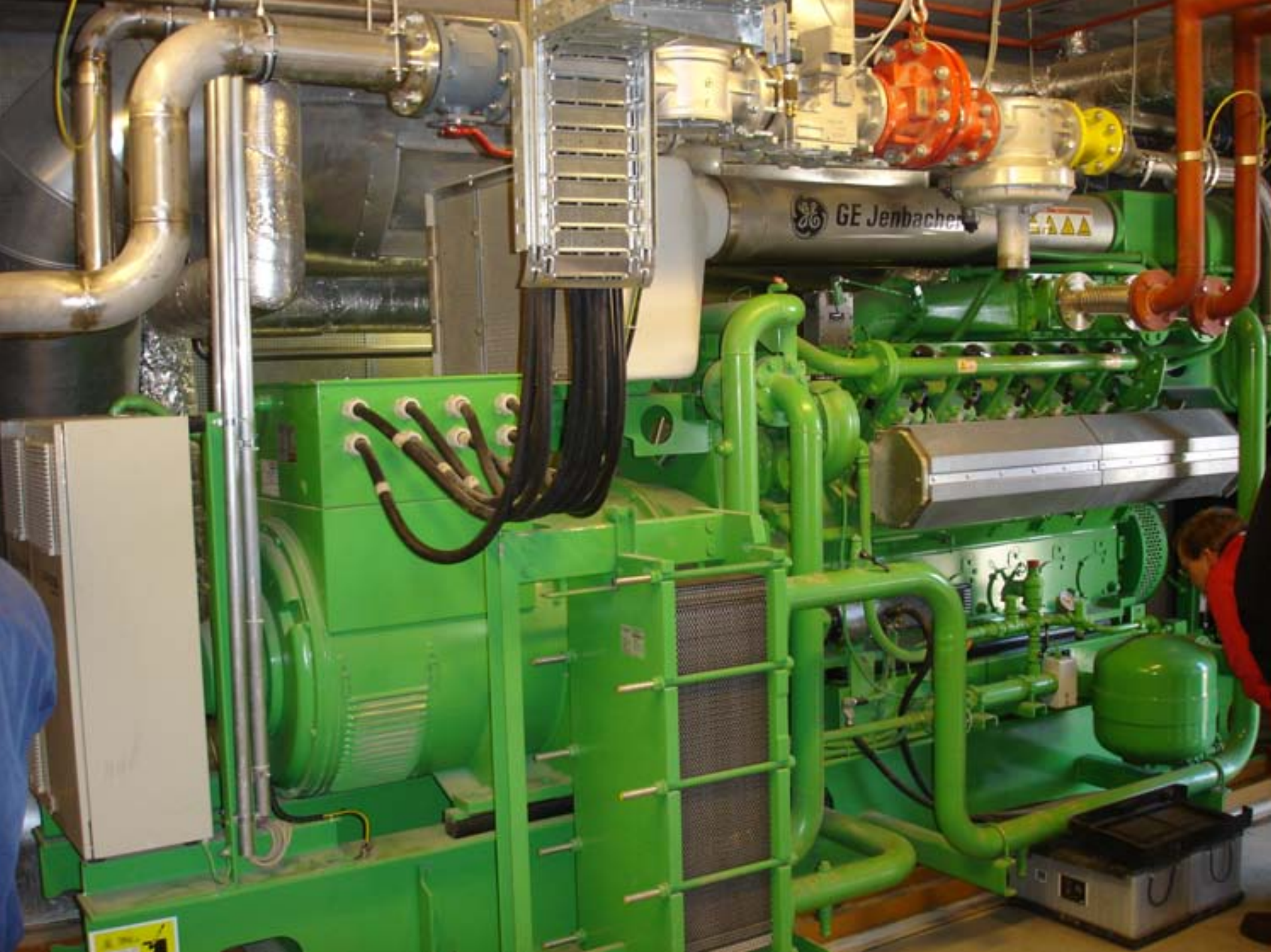




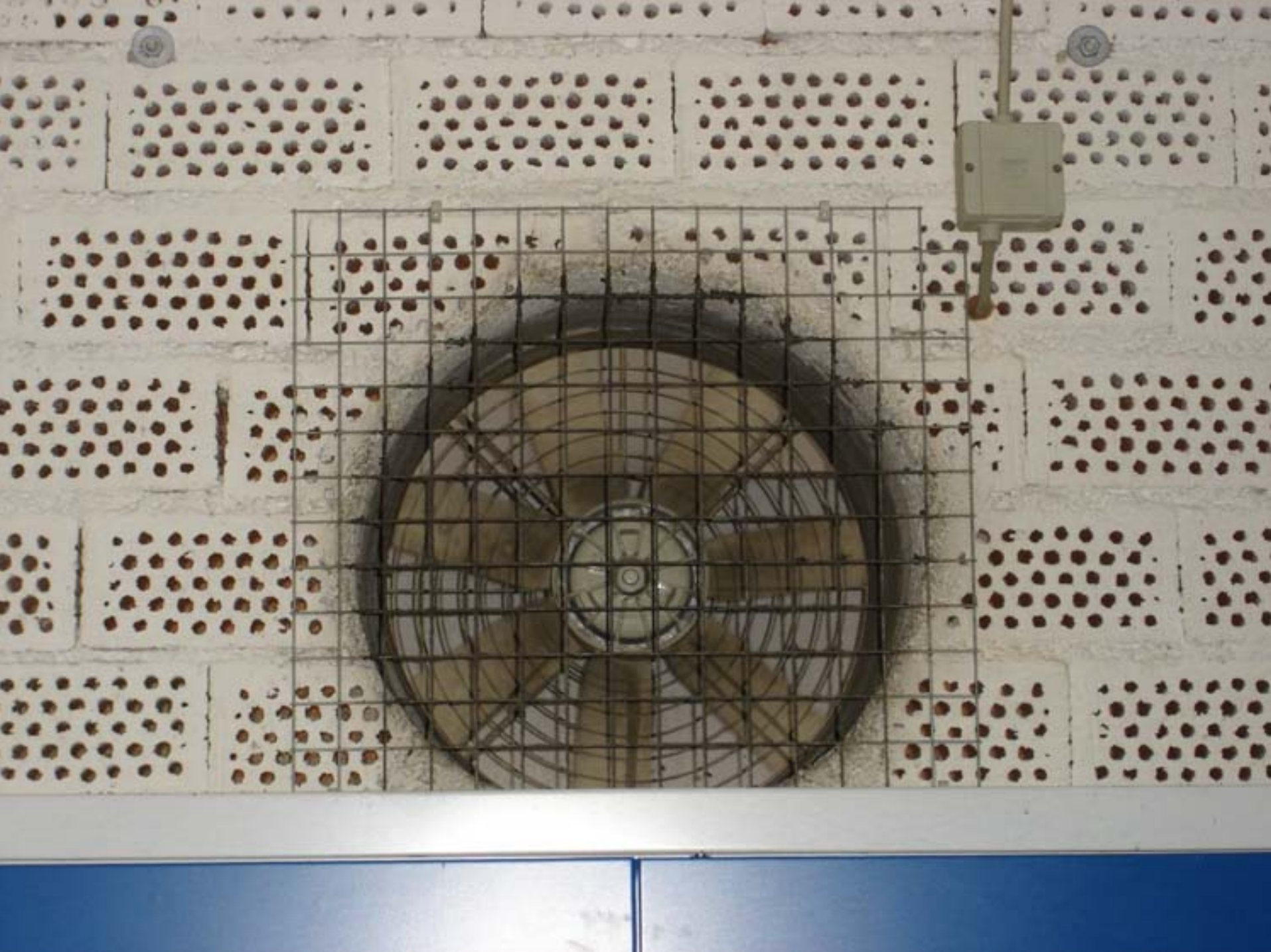




Achtung
Batterie nicht bei
laufenden Aggregat
abklemmen, wegen
Telefonströmung!!!









04/12/2008











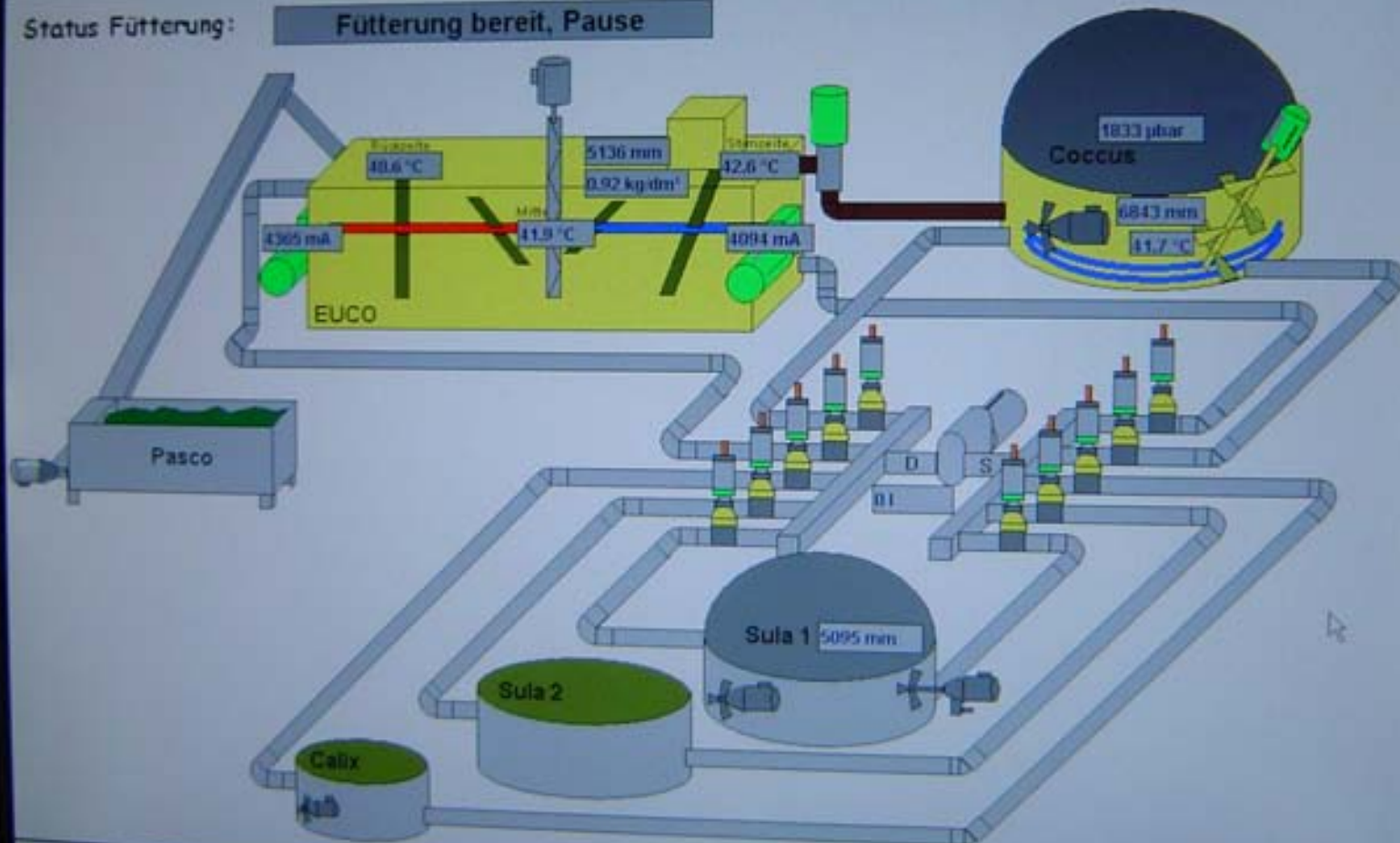






Status Fütterung:

Fütterung bereit, Pause



Gasdruck	Fütterung	Calix	Euco	Coccus	Sula 1	Betriebsdaten	Betriebsstd	SSM 6000	Notepad	Info	Niemand
Biogas	Gasdruck	Heizung	Sandaustrag	Ventile			BTB	BTB aktuelle	BTB Historie	Service	An-/Abmelden
				manuell			Handwerte	Werte			



Information on Anaerobic Digestion...

check out:

Cornell Manure Management

Program's web site at:

www.manuremanagement.cornell.edu

